

CHAPTER III

STRUCTURAL GEOLOGY

Folds

Two periods of folding can be detected from the rocks in the map area. The most prominent folding movements affected the entire suite of lower and upper Carboniferous sediments and is probably related to the Appalachian Orogeny.

In the Carboniferous sedimentary formations, the folded structures have a general northeasterly trend and appear to be more tight and pronounced in the Horton and Windsor sediments than in the younger Canso and Riversdale groups. An excellent example of this can be found in the Mackdale area where anticlinal and synclinal folds affect the Horton, Windsor, and Canso sediments. This feature has been noted in various areas, similar in lithology throughout the Maritime region. Two explanations of this phenomena are: (1) that several periods of folding occurred during the Carboniferous and (2) that the deformation was entirely post Carboniferous in age, being expressed by concentric folding. In this area either of the above explanations could be accepted.

There is no direct evidence of major deformational breaks between the various Carboniferous formations in this area. East of Mackdale the thickness of the Canso appears to be much less than in the Port Hastings area. This conceivably could be due to differential subsidence which apparently was characteristic of the Carboniferous sedimentary basins.

Faults

All major faults in the map area are considered to be gravity faults and to represent the final stage of tectonic deformation. Although practically none have been observed in outcrops, several faults can be postulated on a structural and stratigraphic basis.

A north-south fault and one trending 110 degrees intersect at a point about two and one-half miles northeast of the head of Ship Harbor and form the boundary between two large fault blocks (See Map 2). The movement on these faults appears to hinge on the north end of the

north-south fault as is seen by relative stratigraphic displacement. From the increased dips in the basin-like sedimentary structure in the west block, it can be assumed that this block moved down relative to the gently dipping sedimentary structure east of the fault. Ferguson (1946) has shown that at the point of intersection of the faults the Windsor beds in the westerly block have been depressed in the order of two and one-half miles.

Two northeasterly striking faults, one near MacPherson's Ferry and the other near Whiteside on the north shore of Inhabitants Bay, mark the northwest boundaries of downfaulted Riversdale sediments. Because of the occurrence of thin coal seams and associated lithology, it is believed that in both these downfaulted blocks the upper Riversdale or younger Pennsylvanian strata have been preserved.

Faulting has exposed a triangular area of Windsor and Canso rocks on the northern shore of Inhabitants Bay and on parts of Evans, Freeman, Bumbo, and Round Islands. This block has moved up relative to the surrounding rocks, forming what is considered to be a horst structure.

Evidence of faulting across the Horton-Windsor contact was found near Mackdale. Fault lines parallel to fold axis in this area and the faults are believed to be associated with the folds. No major displacement was noted.

At surface the major faults are confined to post Horton rocks in the northeast portion of the project area, but it is reasonable to assume that at depth they do affect the Horton rocks, as is the case in the adjacent area to the southwest.

A number of faults have been recorded in the project area but are not believed to have caused any significant stratigraphic displacement (Plate No. 8, Figure 2). Topographic expression is seldom apparent along these faults except near shorelines where they frequently are the locus of drainage gullies. The small brooks or gullies entering the coastal waters at MacPherson's Ferry, Sea Coal Bay, and Port Malcolm, serve to illustrate this point.

Age of Faults

With the exception of the faults associated with folding near Mackdale, which are believed to be related to

the Appalachian revolution, of late Palaeozoic age, it appears that all movements are related to a later orogeny. The forces that caused the faulting were non-compressive. As folding and thrusting movements were associated with the Appalachian revolution, it is possible that the block-faulting developed during a more recent period. In the Londonderry and Bass River map areas, Weeks (1948) has shown that block-faulting of Carboniferous beds occurred in late Triassic and Cretaceous times. There is no way to identify accurately the age of the block-faults in the Port Hawkesbury area, but a late Triassic or Cretaceous age would be quite possible.